Global strategy of
Nissan Production Way
Oppama Challenge Updates

February 28th, 2008

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Global strategy of Nissan Production Way
Oppama Challenge

Accomplishment

Activities
Global strategy of Nissan Production Way Accomplishment report of Oppama Challenge

Feb 28, 2008

Vehicle assembly plant (incl. KD) : 26
Powertrain plant : 25

Globalization

Geographic expansion (Russia, India, Morocco, etc.)

Vehicle assembly plant (incl. KD) : 26
Powertrain plant : 25

Globalization

Overview

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Globalization

Vehicle assembly plant (incl. KD) : 26
Powertrain plant : 25

Standardization of hardware (NIMS)
Global production preparation activities (4G)
New development process (V3P)
Information sharing through intranet
Global No.1 challenge activity
Standardization of hardware: Nissan Engineering Standard of NIMS (Nissan Integrated Manufacturing System)

Global vehicle production complement among plants/lines

Plant with NIMS introduced

Global production preparation activity

Engineering/production trial  Start of production

Basic constitution improvement  Prototype quality improvement  Launching support

Global Training Center  Global Production Engineering Center  Global Launching Expert

4G Strategies

Global Package Design Center

Global production preparation activity

Global strategy of Nissan Production Way Accomplishment report of Oppama Challenge

Feb 28, 2008
**GTC (Global Training Center)**

**Early skill improvement with global master trainers**

455 global master trainers (at the end of FY07)

Communicate proper procedures and key points through visualized manuals (Japanese, English, Spanish, Thai, Chinese)

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**GPEC (Global Production Engineering Center)**

**Digitalized know-how** (jigs/tools, inspection tools, controlling data, etc.) to be transferred to mass-production plant

Data transfer

- Plant A
- Plant B
- Plant C

Digital process

Physical process

Robot teaching in body assembly process

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Engineering trial

Production trial

Start of production
GPDC (Global Package Design Center)

Efficiency improvement by early study of packaging

- Digital process
- Engineering/production trial
- Start of production
- Digital packaging
- Physical confirmation
- Vibration test

Packaging volume per part
83% reduction

<ex. BMPR REINF ASSY>

{Control indicator}
Design Standard Volume: Part volume + part filling property
Design Standard Volume Ratio = "Actual packaging style" / DSV

Digital process Start of production Engineering/production trial

83% reduction

《Control indicator》
Design Standard Volume: Part volume + part filling property
Design Standard Volume Ratio = “Actual packaging style” / DSV

Digital packaging
Physical confirmation
Vibration test

GLE (Global Launching Expert)

Diagnose and assess preparation status, and give practical support

- Initial quality control support
- Trial, production preparation support
- Kaizen improvements
- Find problems

Site organization

847 of registrant (as of FY07)

Function

- Genba Kanri
- Quality analysis
- Quality variance
- Vehicle QA
- Part QA
- Equipment reliability
- SCM/logistics

Press  Body  Paint  Plastic  T&C  Final
V3P (Value Up Innovation of Product, Process & Program)

Die manufacturing lead-time reduction by digitalizing know-how of craftsmanship

First die

Simultaneous engineering with design

Forming simulation

Die design → NC data creation → Processing → Finishing

Knowledge management → Measurement

Completion

2nd die & after

44% reduction

V3P

Study of early production start by utilizing digitalization

Engineering trial → Production trial → Start of production

Conventionally, evaluate with actual equipment & prototype

Current: evaluate virtually

Press → Body → Paint → T&C → Plastic → Engine
### Information sharing through the intranet

Web-type global friendly competition

Company intranet

- UK: Sunderland plant
- US: Smyrna plant
- Mexico: Aguascalientes plant
- China: Huadu plant
- Spain: Barcelona plant

Affiliates: e-room (global information sharing area)

### Global No.1 Challenge Activity

Utilize strengths of Japanese plants

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<td>Challenge to high quality and the cost level of 4-cylinder engines</td>
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Japan takes the lead in *Monozukuri*.

Oppama is the leader of “cost”.

![Diagram showing production capability vs. QCT (Quality, Cost, Time) with Oppama leading in future projections.](image)

- LCC: Leading Competitive Countries
- HCC: High Cost Countries

Q: Quality  C: Cost  T: Time

- A
- B
- C
- D
- E

**Oppama Challenge**

- Accomplishment
- Activities
Oppama Challenge is:

"World's top Monozukuri" for the Oppama plant to regain production volume.

It aims to the world's top plant in quality, cost & time by quickly "reforming Monozukuri" through benchmarking with mini cars and LCC companies and strengthening collaboration between genba (manufacturing shop floor) and engineering.

Internal related departments and our partners (suppliers & logistics companies, etc.) cooperatively spearhead reformation and promote quick horizontal deployment to plants in and out of Japan.

Through this reformation, all questions about Japanese plant cost competitiveness should be cast aside. It will greatly contribute to Nissan to improve the level of Monozukuri.

With the "world's top Monozukuri," global cars should be introduced so as to break away from a plant exclusive for the domestic market.
Accomplishment of Oppama Challenge

Summary

- Improved cost competitiveness against LCC countries
  - It was decided to introduce a next-generation model in the Oppama plant.
  - The utilization ratio of the Oppama plant improves.
    (From Sept. ’08, 2nd shift will start in the plant No.1.)

- Globally expand iFA (iFA: cost reduction activities)
  - To be applied globally: Russia, India, Morocco, etc.
Accomplishment of Oppama Challenge

7% of cost reduction from current vehicle

<Breakdown of cost reduction>

Conventional cost reduction
- Spec improvement
- Purchased parts
- Vender tooling
- Customs duties

Oppama Challenge
- 7%
- 454 kaizen items
- iFA (plant cost reduction) -- 204 items
- Logistics cost reduction
- Technical improvement
  - 250 items

Current model

Next generation model

Conventional cost reduction

iFA improves return on investment by 57%

<Transition of return on investment>

- Total number of iFA items in the Oppama plant is 204.
  (Jun. 2002 through now)

- More than 2500 of headcount will be reduced on a global basis.
  (End of FY07 forecast)
Accomplishment of Oppama Challenge

IFA reduces manpower by 15%

Transition of manpower

- Improve value added operation ratio

Low value added: carrying parts, temporary parts placement, etc.
Non value added: squatting, bending, etc.

Conventional: 75% Low/value added, 25% non value added
IFA: 81% value added, 19% low/value added

Further quality improvement

Awarded 1st prize in the domestic compact car segment for 3 years in a row by a third party organization.
Accomplishment of Oppama Challenge

Strengthen global organization for iFA (268 people)

- UK: 63 people
- Spain: 44 people
- China: 3 people
- Japan: 74 people
- US: 63 people
- Mexico: 21 people

Global strategy of Nissan Production Way

- Accomplishment
- Activities
What is iFA?

Integrated Factory Automation

- Integration of manufacturing *genba* (shop floor) & logistics
- Integration of plant & supplier
- Integration of IT & *genba* (shop floor)
- Integration of IT & design/production preparation
- Integration of equipment preparation & production
- Integration of process

What is iFA?

Smooth material flow & low cost automation

Introduce low cost automation

*Karakuri* = automation with wisdom

Make material flow smooth without stagnation by looking into the flow

= Status with no waste

*What is Karakuri?*
What is iFA? (Examples)

**Smooth material flow**

*Conventional operation*

- Concentrate waste in assembly operation and make it obvious
- Need complex mechanism and high investment in automation

**Low cost automation**

*Kitting supply*

- Single material flow (One flow line, one packaging style)
- Only assembly operation
- A potential for automation can be seen now.

**Realize “low cost automation”**

- Introduction of AGV (automatic guided vehicle)
- Automatic box transfer device (Karakuri)
iFA promotion structure in Oppama Challenge

Members from each section and plant are concentrated.

Watanabe SVP
Honda Plant Manager

<Oppama plant>

MFG Dept.
General Mgr

Facilities
Maintenance Sec.

Production
Control Sec.

Engineering
Sec.

UK

Mexico

Kyushu plant

Tochigi plant

IKA Project Team

Spain

China

US

Nissan Shatai

Production Engineering

Activities of Oppama Challenge

Total number of iFA kaizen improvement items is 204.

- Trim & Chassis shop
- Body assembly shop
- Plastic molding shop
Activities of Oppama Challenge

**Cost reduction by adopting general automobile steel**

Transition of adopting in-house press parts

- Current: 74%
- Next generation: 95%

**Study of corrugation through forming simulation**

Activities of Oppama Challenge

**Total cost (purchasing, in-bound logistics & in-house costs) reduction**

- Delivered after being assembled
- SNP=2 (0.038m³/unit)

- Divided into parts to be assembled in the Oppama plant
- SNP=4 (0.028m³/unit)
- SNP=16 (0.004m³/unit)

SNP: Standard Number of Package
Activities of Oppama Challenge
Cost reduction by logistics sharing and direct delivery

Current

Tier1 Plant
Devanning
NCIC
Port
Other company

Logistics responsibility
NISSAN
Supplier

Future

Tier1 Plant
Devanning
NCIC
Port

Tier2 Plant
Devanning
Port
Other company

Logistics responsibility
NISSAN
Supplier

PLC: Parts Logistics Center

NCIC: Nissan China Investment Co., Ltd.